**Hoya thuathienhuensis and Hoya graveolens (Apocynaceae, Asclepiadoideae), a new species and a new record for the Flora of Vietnam**

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**Key words**
- evergreen forest
- Hue Green Corridor
- Marsdenieae
- Thailand
- Vietnam

**Abstract**
A new species from the Annamite mountain range of central Vietnam, *Hoya thuathienhuensis*, is here described and illustrated. Its flowers bear similarity with *Hoya lockii*, a taxon recently described from the same area with which it shares the reflexed corolla and the thin coriaceous laves. *Hoya lockii* is an epiphytic shrub, whereas *H. thuathienhuensis* is a strong climbing liana. We also report the noteworthy extension into southern Vietnam of *Hoya graveolens*, a taxon previously considered to be endemic of Thailand.

**INTRODUCTION**
Vietnam has at least 22 *Hoya* R.Br. species (Phạm 1993, Trần et al. 2011a, b, Rodda 2012, Phạm & Averyanov 2012). Eight of these can also be found in neighbouring China (He et al. 2009, Li et al. 1985, Rodda 2012) and six in Lao PDR (Newman et al. 2007, Rodda 2012).

Field investigations carried out in 2010 in central Vietnam resulted in the discovery of a further new taxon whose white reflexed corollas and thin coriaceous laves superficially resemble those of the co-occurring *Hoya lockii* V.T.Pham & Aver. (Phạm & Averyanov 2012) but its growth habit is unique among Vietnamese *Hoya* being a strong climbing terrestrial liana. In the present paper the new species, *Hoya thuathienhuensis* T.B.Tran, Rodda & Simonsson, is described and illustrated and its morphological affinities with other *Hoya* species are discussed. Additionally, *Hoya graveolens* Kerr, a taxon in need of lectotypification, is recorded for the first time for the flora of Vietnam.

*Hoya graveolens* was so far thought to be endemic to Thailand. Herbarium records indicate that apart from a single specimen collected in Nakorn Ratchasima Province (*Maxwell 76-313*) the species appears to be limited to coastal areas in the proximity of Siracha, the type locality.

Floristic investigations in the karst hills of Kiên Giang Province in southern Vietnam in 2007, 2008 and 2009 by one of the co-authors resulted in the collection of three specimens later identified as *H. graveolens*, thus extending its distribution area eastward more than 500 km. The study of herbarium materials and the observation of the species in situ in Vietnam allowed us to prepare an extended description of the taxon and highlighted the need to select a lectotype.

**TAXONOMY**

*Hoya thuathienhuensis* T.B.Tran, Rodda & Simonsson, *sp. nov.* — Fig. 1

Species insignis, a specicus nobis notae bene distincta. Ad *Hoyam lockii* similis ob corollam reflexam et folia lanceolata coriacea; differt ob corone lobos rotundatos non compressos. — Typus: M. Rodda LT10-056 (holo HN; iso K, SING), cultivated in Turin, Italy, 9 March 2011, from specimen originally collected in Vietnam, Thừa Thiên-Huế, A Roang, 800 m asl, strong twiner in open secondary forest c. 20 m high.

**Etymology**
*Hoya thuathienhuensis* is named after the only Vietnamese Province where it has been so far collected, Thừa Thiên-Huế Province in central Vietnam.

Vigorous terrestrial climber with white latex. **Leafy stems** cylindrical, green, up to 5 mm diam, hirsute; older stems leafless, lignified, c. 10 m long, bark peeling, dark brown or grey, glabrous. Internodes (4.5–)15–25 cm, adventitious roots present only if stems in contact with substrate. **Leaves** with petiole adaxially channelled, green, 9–13 by 1.5–2.3 cm, sparsely pilose; lamina coriaceous, oval to elliptic, adaxially dark green with sparse whitish spots, lighter abaxially, 3–6 by 10–15 cm, glabrous, apex cuspidate, base shortly attenuate, penninerved, main vein depressed on adaxial surface, evident on abaxial surface, secondary veins 6–10 pairs evident when dry, held at 60–80°, anastomosing near leaf margins. **Involucre** positively geotropic, pseudo-umbelliform, convex, 5–8 cm diam, up to 40-flowered; peduncle extra-axillary, dark green, perennial, presenting scars of previous flowerings, 8–15 cm long, c. 2 mm diam, hirsute when young; pedicels terete, reddish green, 2–3 cm long, c. 0.8 mm diam, glabrous. **Calyx** reddish green, 3–4 mm diam, lobes broadly ovate c. 1.5 by 1 mm with ciliate margins, apex acute, with 1–2 basal callus at the lobe sinus. **Buds** globose, slightly 5-angled, ivory white. **Corolla** reflexed, white, 14–16 mm diam (20–25 mm when flattened), lobes ovate-lanceolate, 9–11 mm long, free lobe c. 8 by 4–4.5 mm, margins reflexed, apex apiculate, corolla lobes overall glabrous but densely hirsute underneath the corona only. **Corona** stami-
Fig. 1 Hoya thuathienhuensis T.B. Tran, Rodda & Simonsson. a. Sterile branch; b. inflorescence; c. flower, lateral; d. flower, longitudinal median section; e. flower, from above; f. corona, underside; g. pedicel, side and frontal view; h. pollinarium (all: holotype). — Scale bars: a = 5 cm; c–g = 5 mm; b = 1 cm; h = 0.5 mm. — Photos by M. Rodda.
Fig. 2 *Hoya graveolens* Kerr. a. Leafy shoot; b. inflorescence; c. hairs at the base of colla lobes; d. leaves; e. dissected flowers; f. pollinarium (all: Lý 521, HN, P, SING, VNM). Scale bars: c, f = 100 μm; d = 2 cm; e = 1 cm. — Photos by Lý Ngọc Sâm.
narrow, dull yellow, 8–10 mm diam, 4.5–5.5 mm high, filament tube pubescent; lobes from above ovate-rounded, laterally oblong, c. 4 by 3.5–4 mm, inner process acute, converging, outer process apex round, inner process exceeding anthers by 0.5–1 mm. Pollinarium (all measurements approximate) 750 by 500 μm with two oblong pollinia, 550 by 200 μm, apex and base obliquely truncate, retinaculum 90 by 120 μm, caudicles broad, basally connected to the retinaculum c. 200 μm long. Ovary bicarpelate, each carpel bottle-shaped, light green with pink tips, c. 2 by 0.7 mm, glabrous, apex acute, Fruits and seeds not seen.

Distribution — Thua Thien-Hue province in Vietnam.

Habitat & Ecology — Hoya thuathienhuensis has been observed in secondary evergreen low montane forest up to 20 m high, in proximity to primary forests. It is a strong climbing liana, rooted in the humus-rich forest floor.

Conservation status — The only locality where H. thuathienhuensis has been recorded is within the proposed conservation area of the Hue Green Corridor (Averyanov et al. 2006) thus supporting the long term preservation of the species in situ. Nonetheless, H. thuathienhuensis is to be considered Data Deficient (DD) according to IUCN Red List criteria (IUCN Standards and Petitions Subcommittee 2011) because it is known from only one collection and thus remains in need of further investigation with respect to future conservation efforts.

Notes — When H. thuathienhuensis was first observed in the field it was not in flower. From its vegetative structures, a strong terrestrial climber with corymbose glabrous leaves, we first thought it may not belong to the genus. What made us initially think that H. thuathienhuensis may indeed belong to the genus is its extra-axillary, positively geotropic peduncles, bearing scars of previous flowerings thus diagnostic of the genus (Omlor 1996). After flowering in cultivation it became clear that the taxon belongs to Hoya and bears superficial similarities with co-occurring H. lockii, the only other Hoya species observed in the Hue Green Corridor apart from Hoya camosa R.Br. so far. It can be easily separated from H. lockii because of the growth habit: H. thuathienhuensis is a strong climbing liana while H. lockii is an epiphytic shrub. Further, the corolla lobes are similarly reflexed and densely hirsute underneath the corona in both species but in H. lockii they are also slightly pubescent elsewhere and ciliate while in H. thuathienhuensis they are glabrous and brilliant; the corona lobes are ovate-round with a short acute inner process depressed among the prominent outer processes (Fig. 1) while in H. lockii the corona lobes are laterally compressed and present a prominent inner process bearing a caudate, erect or slightly converging or diverging appendage with a linear, slightly recurved apex, extending 2–4 mm above the apex of the outer process.

The general habit of the plant, a strong terrestrial climbing liana, as said, is rare in Hoya and usually typical of species belonging to Hoya sect. Eriostemma. Species in this section are characterised by mainly terrestrial, non-epiphytic habit, inflorescences on short-lived or deciduous peduncles and large and fleshy corollas with proportionally small coronas (Wanntorp et al. 2011). No species of Hoya sect. Eriostemma are known to occur in Vietnam. Pollinia in species belonging to sect. Eriostemma consist of club-shaped pollinia lacking pellucid margins, attached to the retinaculum by twisted and winged caudicles (Wanntorp et al. 2011). With its perennial peduncles, smaller flowers and oblong pollinia with a clearly distinguished pellucid margin attached to the retinaculum by short broad caudicles (Fig. 1h), H. thuathienhuensis does not belong to sect. Eriostemma. Its sectional placement is uncertain and on the basis of pollinaria shape, it falls in a phylogenetically unsupported group of species bearing narrow elongate pollinia longer on one side, pellucid margin along the entire dorsal edge, a narrowly rhomboid retinaculum apically pointed and unwinged caudicles (Wanntorp 2007) whose sectional placement will need to be re-evaluated following recent molecular evidence (Wanntorp et al. 2011).

Hoya graveolens Kerr — Fig. 2


Hoya graveolens was described from a specimen collected in Sriracha, Thailand by Kerr in 1920. Kerr selected as type his collection Kerr 4245 but did not indicate in which herbarium it was deposited thus a lectotype has to be selected. We found duplicates in BM, K and P and we hereby select the BM specimen as lectotype since it is a complete specimen with leafy stems and flowers. It is also the only specimen belonging to Kerr’s own herbarium (labelled: Herb. A.F.G. Kerr – Bequeathed 1942) and bears pencilled drawings and measurements of the flowers likely by Kerr’s hand.

Terrestrial or lithophytic decumbent climber with white latex. Leafy stem slender, cylindrical, green, c. 5 m long, 2–7 mm diam, glabrous, older stems leafless, rust-brown with brown spots, with swollen nodes, glabrous. Inflorescences 2–16 cm with inactive adventitious roots below old nodes, located at or up to 2 mm below the nodes. Leaves petiolate; petiole curved, green to purple-brown with few brown spots, perennial, presenting scars of previous flowerings, (17–)30–38(–55) mm long, c. 2 mm diam in the central portion, up to 3.5 mm at the apex, glabrous; pedicels terete, green or purple-brown, 1.3–2 cm long, c. 0.6 mm diam, sparsely hirsute. Calyx purplish green to light purplish, 3.4–4.1 mm diam, lobes triangular-ovate 1.7–2 by 0.8–1 mm, apex acute with a membranaceous margin, sparsely hairy inside, outer glabrous. Buds slightly 5-angled, creamy-white. Corolla rotate, concave, white adaxially and purplish white abaxially, 1.5–1.6 cm diam, lobes rhomboid-ovate, membranous, 8–8.3 mm long with free part 5–5.5 by 5–6 mm, margin reflexed, apex pointed and recurved, pilose throughout, hair length near corona 375–450 μm, near apex 300–375 μm. Corona staminal, tranlucent purplish white, turning purple at base, 5.5–5.7 mm diam, 2.5–3 mm high, glabrous; lobes ovate, held horizontally, 2.5–3 by 1.3–1.5 mm, inner process acute, outer process round, inner process exceeding anthers 1–1.4 mm. Pollinarium (all measurements approximate) 980 by 700 μm, pollinia oblong, 830 by 300 μm, apex obliquely truncate, base acute-round, retinaculum 370 by 180 μm, caudicle 100 μm long with appendages. Ovary bi-carpellate, each carpel ovate, light greenish, 1.2–1.5 by 0.5–0.7 mm, glabrous. Follicles fusiform, yellow dotted dark red-black c. 8 cm by 7 mm; seeds flattened, c. 5.5 by 1 mm, comose.

Distribution — So far only observed on three small karst hills along the coast in Kiên Giang Province, southern Vietnam.

Habitat & Ecology — Terrestrial or lithophytes, decumbent or weakly climbing, found in shaded areas at 0–110 m asl. The prevailing climate in this area is monsoon subequatorial climate with an annual rainfall of 2100 mm and average temperature of 27.4 °C (Nguyễn et al. 2000). This species has been observed flowering in Vietnam from April to May, in accordance with the flowering period observed in Thailand (March to May).
IUCN assessment — In Vietnam, *H. graveolens* has been observed only on the isolated karst hills of Kiên Giang Province in a total area of less than 3 km². This area is being destroyed by human impacts such as fuel wood cutting, small scale agriculture, and exploited for cement production, making the species likely to become threatened in the future. Based on the IUCN Red List criteria (IUCN Standards and Petitions Subcommittee 2011), we assign a provisional conservation status of Near Threatened (NT).


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